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Application of Scale, Projection and Lettering in Architectural Design

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ABSTRACT

Design consists of ideas and combinations of techniques, elements of design and the use of ideal spatial creation. Balance and Positive combinations of form and functions has to follow certain principles of design and drafting. Design can be successful only when rules for scaling, proportion, light, colour, form and other elements are used tactfully with concepts and proposals. Scale, Projection are the tools which bring into reality the idea created in mind and comes into form when projected according the linear, angular and radial projection rule applied. This paper signifies the role of scale used in drawing various parts, the projections needed to detail out the arts and lettering to make it understandable for the viewer. We discuss here about scale, the need for scale, geometric construction to form the spaces, projections on horizontal and vertical planes defining the whole element.

KEYWORDS: *Scale Projection, lettering in design*

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1. INTRODUCTION:

Designing and Developing are two prime stages in creating anything. Designing deals with the ideas, thoughts and requirement where as developing deals with technicalities, tools, representation and manufacturing. The introductory foundation of art and design deals with the elements and principals of design composition has already been discussed in previous versions of the paper. Here we learn about the details of drafting, and developing the exact replica of the thought process to produce visible features of the developing stages. It also entails a brief knowledge of Indian religion, traditional and contemporary art and their uses in home. It also gives experience in freehand drawing, scale drawing, knowledge of law of field size and creating designs of art objects. Design is very much a part of our daily lives, it is found in nature as well as in man-made environment. Shapes, forms, colours texture etc. all combine to become a unify whole, which is commonly called "a design" arrangements one becomes aware of shapes, form, colour and texture. When each individual part (element), unifying in its own way, has carefully been placed together with all the other parts, it results in a unifying and beautiful whole (one design). Designing then is the act of arranging things to create a single effect. In designing the "elements" are the things we work with and the principals are what we do with them (elements). Scale, Geomtery and Lettering with proper projection help us to view the object of design in true shape and proportion. All the details of scaling and projections are studied in the paper showing the methods of preparing a drawing to scale.

2. SCALE DRAWING

2.1. WHAT IS SCALE?

Small objects can be drawn of the same size. A 20cms. (8") long stick may be shown by a drawing of 20cm length (8").

Drawing prepared of the same size as the objects are called full-sized drawings and ordinary full-sized scales are used for drawings.

2.2. Increasing and reducing scales

It may not always be possible to draw full sized drawings; they are therefore drawn proportionately larger or smaller.

Drawings of watches, small machine parts, mathematical instruments etc. are made larger than their real size. Those are said to be drawn on an increasing scale whereas drawings which are drawn smaller than the actual size of the object as in the case of furniture, buildings, bridges etc., the scale used is said to be a reducing scale.

2.3. The Representatives Fraction (RF):

The ratio of the drawing to the object is called representative fraction. When 1 cm (metric unit) long line in a drawing represents 1 meter length of the object. The RF=1cm/1ml=1/100 and the scale of the drawing will be 1/100th full size" or drawing to 1:100 scale.

Similarly, it can be applied to the British system of inches and feet.

2.4. SCALE FOR DRAWINGS:

Drawing shapes to scale 1:1 when each unit on drawing depicts same unit in real. It measn 1 cm on drawing would depict 1 m or 1 km on the real scale.

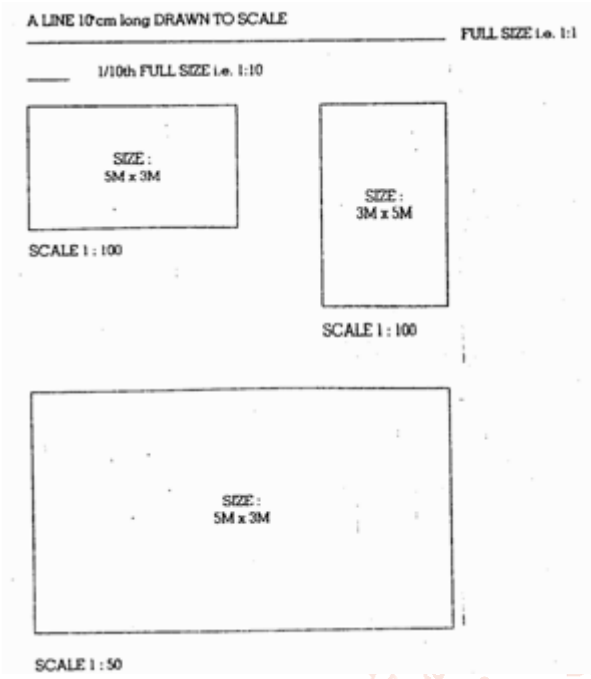

Figure 1 Scale 1:1, 1:100 and 1:50

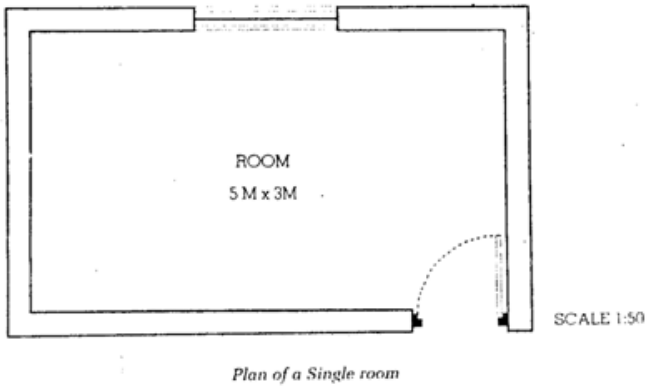

Figure 2 : Plan of a Single room at scale of 1:50

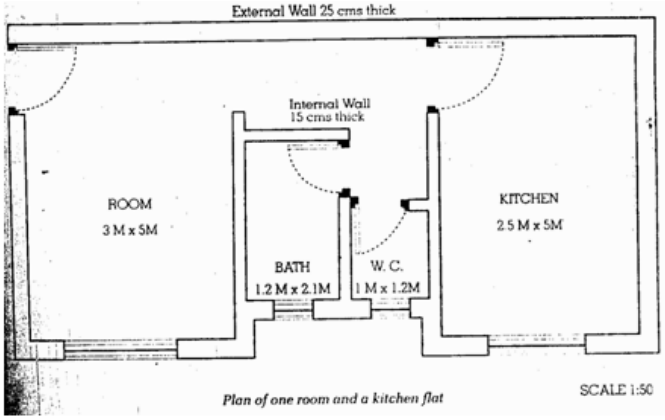

Figure 3 Plan of one room and a kitchen scale 1:50

3. GEOMETRIC CONSTRUCTION

3.1. EQUILATERAL TRIANGLE

To construct an equilateral triangle, given the length of the side.

3.1.1. With T-Square only:

With T-square, drawn a line PQ of given length.

With 30°-60° Set-square and T-square, draw a line through P marking 60 degree angle with PQ.

Similarly, through Q, draw a line marking the same angel with PQ and intersecting the first line at R. then PQR is the required triangle.

3.1.2. With the aid of a compass:

With centers P and Q and radius equal to PQ, draw arcs intersecting each other at R join R with P and Q.

Then PQR is the required triangle.

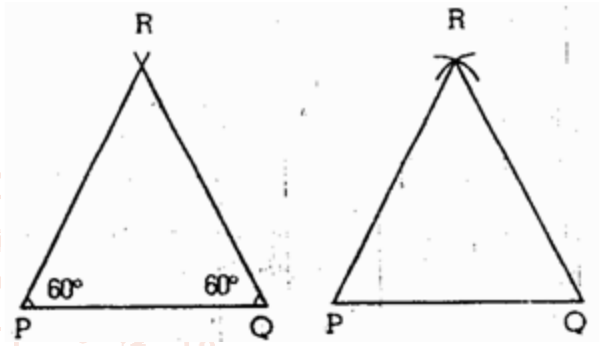

Figure 4 Equilateral triangle (Manual)

3.2. SQUARES:

To construct a square, length of a side is given.

3.2.1. With T-square and set-square only:

With and T-square, draw a line PQ equal to the given length.

At P and Q, draw verticals PA and QB. Draw a line PR inclined at 45 degree to PQ, cutting PB at R, drawn a line QS inclined at 45 degree then PQRS is the required square.

3.2.2. With the aid of a compass:

Draw a line PQ equal to the given length. At P, draw a line PA perpendicular to PQ.

With center p and radius PQ, draw an arc cutting PA at S. with centers Q and S and the same radius, draw arcs intersecting at R. draw PQRS is the required square.

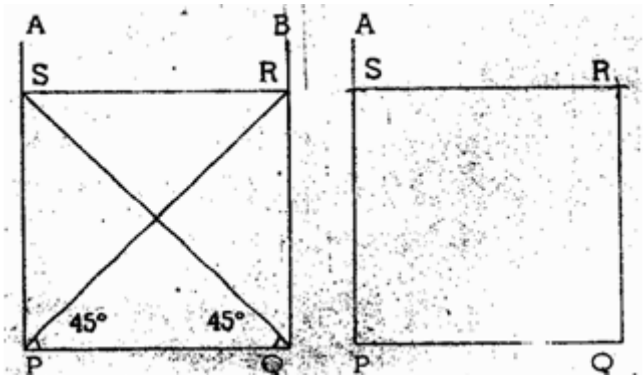

Figure 5 Construction of Square

3.3. HEXAGON:

To construct a HEXAGON length of a side is given.

3.3.1. With T-square and 30°-60° set-square only:

Draw a line PQ equal to the given length.

From P, draw lines P1 and P2 making 60 degree and 120 degree angles respectively with PQ.

From Q, draw lines Q3 andQ4 making 60 degree and 120degree angles respectively with PQ.

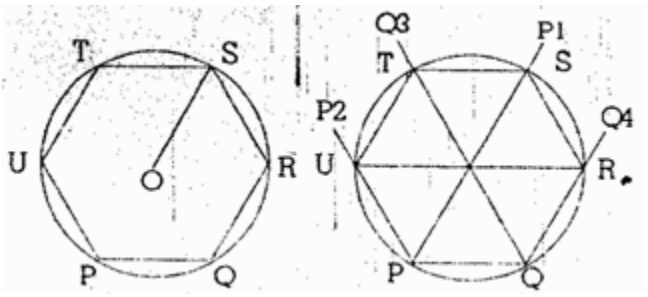

Figure 6 Construction of hexagon

From O the point of intersection of P1 and Q3, draw a line parallel to PQ and intersecting P2 at U and Q3 at R.

From U, draw a line parallel to PU and intersecting P1 at S.

Draw a line joining T and S.

Then PQRSTU is the required hexagon.

3.3.2. With aid of a compass:

With any point O as center and radius equal to the given length, draw a circle.

With the same radius and starting at any point on the circle, set off six division on the circle.

Join the division points in proper sequence and complete the hexagon.

4. LETTERING

Writing of titles, dimensions, notes and other detail particulars on a drawing is called lettering. It is an important part of a drawing. However accurate and net a drawing may be drawn, its total look is spoiled by poor lettering and sometimes its usefulness is impaired. Lettering should therefore, be proper in a clear, legible and uniform style. It should be in plain and simple style so that it could be done freehand and speedily. For the beginners, one may allow, but in general, use of drawing instruments in lettering should be avoided. It also takes considerable time. Efficiency in the art of lettering can be achieved by careful and continuous practice. Size of letters, thin or bold and height of letters, small or big should be selected on the basis of the importance of the matter such as title, subtitle and other information's.

For this study, the under mentioned two types of lettering is considered: (i) single- stroke letters and (ii) gothic letters.

4.1.1. Single stroke letter:

- These are the simplest form of letters and are generally used in most of the technical, architectural and engineering drawings. The word single- stroke does not mean that the letters are written in one stroke without lifting the pencil but it actually means that the thickness of the line or the letter should be such as is obtained in one pencil stroke. The horizontal lines of the letters should be written from left to right and vertical or inclined lines from top to bottom. Single- stroke letters are also written in two ways (a) vertical and (b) inclined.

Inclined letters lean to the right, the slope being 67 ½ degree with the horizontal. The size of a letter is described by its height. The ratio of height to width varies but in most of the cases it is 6:5.

The Vertical letters are generally at 90 degrees to the horizontal and the size of the letter in most of the cases is in the ratio of height to width is 1:1.

Lettering is generally done in capital letters. Different sizes of letters are used for different purposes: the main tittles are generally written in big and thick letters, subtitles in medium and thin letters, while notes, dimensions, figures, etc. in small and thinner letters.

ABCDETGHIJKLMN

OPQRSTUVWXYZ 5 7/16

1234567890 2 ¾

For maintaining uniformity in size, thin and light guidelines may first be drawn and lettering may then be done between them. The letters should be so spaced that they do not appear too close together or too far apart. The distance between the words must be uniform and at least equal to the height of the letters. The distance between the lines of the letters must be equal to the height of the letter. And in case of a photograph, it should be minimum 1 ½ times.

Gothic Letters: Stems of a single stroke letter if given more thickness, forms, what are known as Gothic Letters? They are mostly used for main titles. The outline of the letters is first drawn with the aid of instruments and then filled-in with ink. The thickness of the stem may vary from 1/5th to 1/10th of the height of letters.

A B C D E F G H

I J K L M N O P Q

R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0

The drawing above shows the alphabets and figures in gothic with thickness equal to 1/7th of the height.

5. ORTHOGRAPHIC PROJECTIONS

Solid geometry deals with the representation of points, lines planes and solids. On a flat surface (such as a drawing paper), in such a manner that their relative positions and true forms can be accurately determined.

5.1. Projection:

If straight lines are draw from various points on the contom* of an object to meet a plane, the object is said to be projected on that plane. The figure formed by joining the points at which plane are called projectors.

5.2. Orthographic Projections:

When the projections are parallel to each other and also perpendicular to the plane, the projection is called Orthographic Projection (sketch).

Orthographic Projections is the method of drawing three dimensional objects in two dimensional objects in two dimension by means of related views called plans, elevations and sections. This simply means a parallel or perpendicular projection. Most buildings, furniture and fitting designs are prepared in this way.

5.3. Planes of Projection:

The two planes employed for the purpose of orthographic projection are called reference planes.

5.4. Principle – Planes of projection:

They intersect each other at right angles. The vertical plane of projection (in front of the viewer) is usually indicated by the letters VP. The other is the horizontal plane of projection indicated as HP. The line of which they intersect is termed as the ground line. The projection on the VP is the front elevation of the object and is commonly known as elevation. While that on the HP is called the plan. The elevation is another name for front views; similarly the plan is another name for top view. (Sketch)

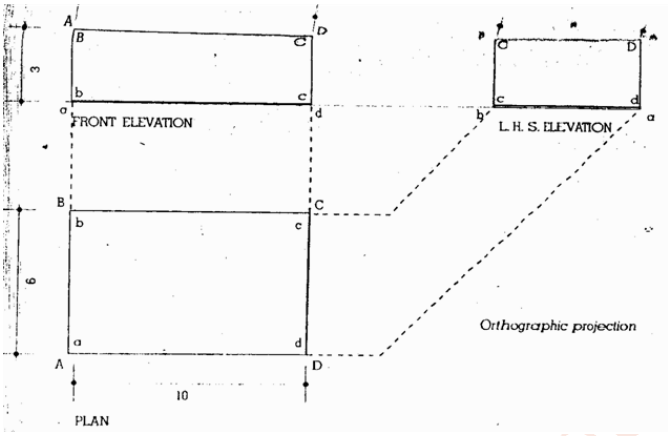

Figure 7: Projection of Plan. Front Elevation and Left Elevation

There are a number of cases where it is neither necessary nor advisable to use perspective projections in showing three dimensional object/parts of objects. In assembly diagrams, details of joints and many similar cases where a three dimensional view of an object is necessary for technical reason, it is often an advantage to be able to obtain accurate measurements from the drawing. In such cases the use of metric projection is preferable.

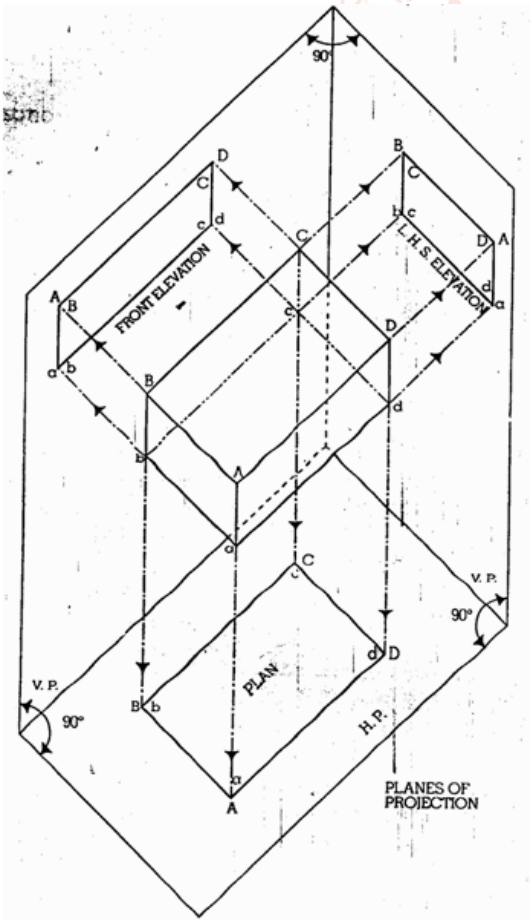

Figure 8 Principles of Projections

5.5. METRIC PROJECTIONS

There are methods of drawing buildings or objects so as to give a three dimensional appearance yet in such a way as to allow length, breadth and height to e measured. They are set up from orthographic projections and can be drawn to any required scale. The most used projections are isometric, axonometric and oblique.

5.5.1. Isometric projection:

It is particularly suitable for machine drawings, joinery etc. Since it gives a realistic effect. The drawing is made with a T-square and 30 degrees set square. The base line of the object is drawn at 30 degree to the horizontal, length; breath and height are drawn to the actual scale in forming three dimensional view of the object.

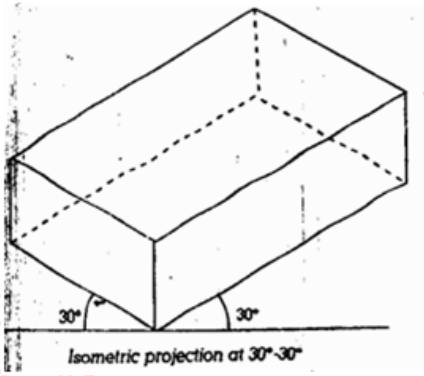

Figure 9 Isometric Projection

5.5.2. Axonometric Projection:

It is particularly suitable for showing diagrammatic interiors of buildings, since it has the advantage of containing a true plan of the object and is therefore more easily set up from existing drawing. Axonometric projection can be made at any angle to the horizontal, but for convenience, they are usually drawn at either 45 degree/45 degree or 30 degree/60 degree.

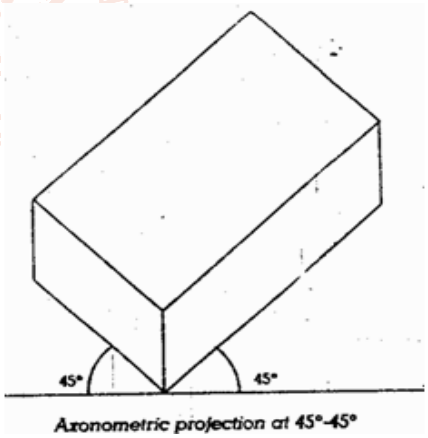

Figure 10 Axonometric Projection at 45 degree

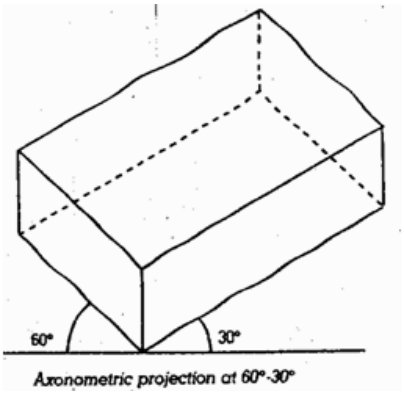

Figure 11 Axonometric Projections at 60-30 degree

5.5.3. Oblique Projection:

The plan is distorted; as in metric projection. There are two variations on the method (1) the oblique lines are drawn at 45 degree to the horizontal and distances along them are measures at half the scale of that used for the horizontal and vertical lines; (2) the oblique lines are drawn at 30 degree to the horizontal and distance along them are measured at the same scale as that used for the horizontal and vertical lines.

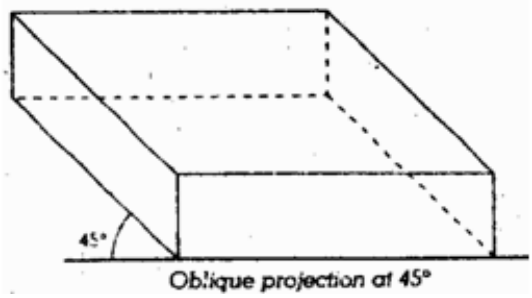

Figure 12 Oblique Projection

5.5.4. Diametric:

Diametric drawings of interiors are also turned for the viewer. They are often more desirable than an isometric for a presentation because they permit flexibility in their execution. Two of the planes or walls can be emphasized or subordinated through the utilization of two scales and several combinations. The height and width of the room are kept in the scale of the drawing and the depth is reduced to 3/4 scale. With the 15°-30° combination the width remains in scale and the height and depth are reduced to 3/4 scale.

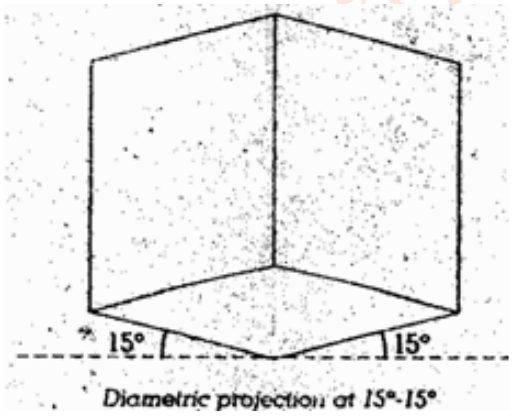

Figure 13 Diametric Projection at 15 degree

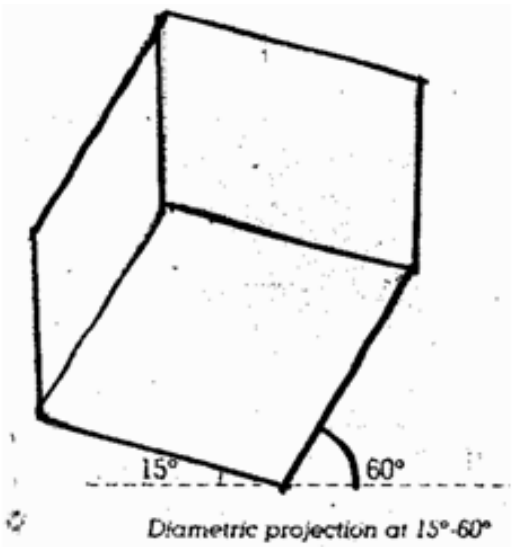

Figure 14 Diametric Projection at15-60 Degree

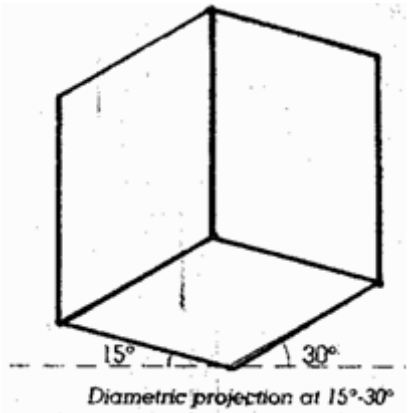

Figure 15 Diametric Projection at 15-30 degree

Diametric, therefore, take longer to draw.

Although diametric drawing presents the most realistic illustrations of all the axonometric drawings, there still is no opportunity to include unique features located on opposite walls as in a one point perspective.

The use of metric projections is limited and is usually not acceptable, for various reasons, to an architect or designer, or to the client, who wants to see the finished products. Thus it is necessary to prepare a perspective projection.

6. Conclusion:

Scale and Projections make the drawing perfect in most interesting ways. Scale drawings are a useful tool for any designer, because they can be used to plan, visualize and adjust landscape plans before breaking ground. Scale drawings assign each object the same scale compared to the actual objects.

An accurate **scale** drawing lets you see exactly how each component will fit and how much space you'll have, both empty and filled. Whether you are addressing space concerns, adding or rearranging components or even working on multiple designs, scale will always play a key role in the planning of your project

Orthographic drawings are typically two dimensional views of an object. For instance, if you were designing a table, you would draw a top view, side view and a bottom view. Should these three views not fully explain the design of the table other views would need to be drawn. When drawing an perspective view in an orthographic manner, you would utilize a 45 degree triangle for the lines that extend back or forward from the vertical lines. This type of perspective is not a true perspective because you can measure the true length of all the details shown.

An isometric drawing is meant to depict a 3D image of an object in what appears to be a perspective view. However, similar to an orthographic perspective, all of the lines in an isometric drawing can be measured to their true length. What makes it different from an orthographic perspective is that its angled lines are drawn at 30 or 60 degrees or divisions of them. Drawing this by hand you would use a 30/60/90 triangle.

In either case, both types of perspectives can be accurately measured with a ruler in order to know the objects measurements.

These principles are usually taught in a drafting class, but may be taught in advanced art as well. Orthographic views may be drawn out on a page to show top, front and side

views of an isometric drawing that is also drawn on the page as well. This is a basic drafting design setup.

Designing purpose of projects need redefinitions, architects own ideas also bound to change because it is critical to be observing the present trends.

Architects will have their Exposure and Experience for designing projects. Hence the variety and diversity vise versa. This is the time to promote Architects collectively promote architecture projects and as well Educational based policies. Thematic approaches including cost conscious construction, culturally appropriate, climatically confirming, creativity, dialoguing, Energy Embodied, harmony with nature, scale of spaces, sequential privacy, connectivity, visual depths, functional flexibility, visual perception, experience of users and life cycle matters.

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